A. G. POTTER.

DOOR SPRING.

APPLICATION FILED DEC. 27, 1910.

1,010,071. Patented Nov. 28, 1911.

Fig. 1.

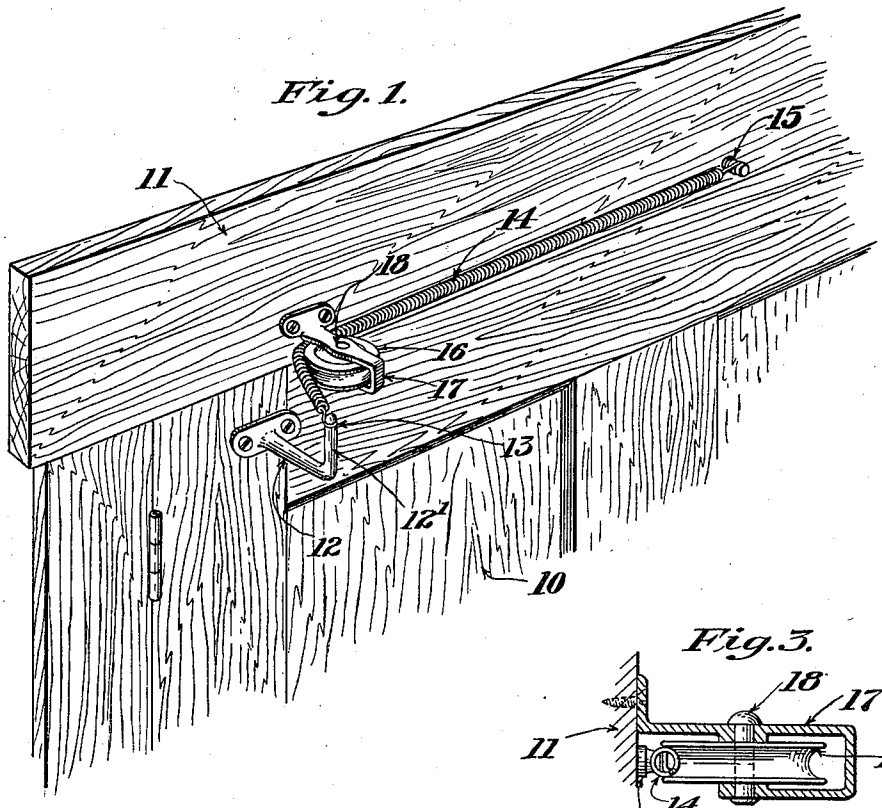
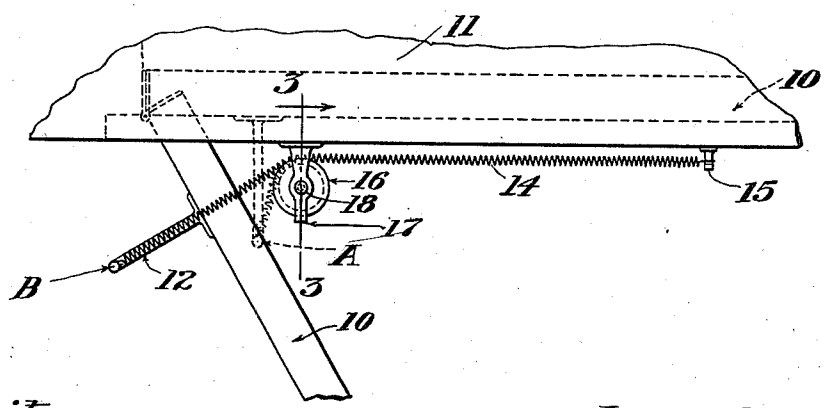


Fig. 3.

Fig. 2.



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UNITED STATES PATENT OFFICE.

ALBERT G. POTTER, OF SWAMPSCOTT, MASSACHUSETTS.

DOOR-SPRING.

1,010,071. Specification of Letters Patent. Patented Nov. 28, 1911.

Application filed December 27, 1910. Serial No. 599,515.

To all whom it may concern:

Be it known that I, ALBERT G. POTTER, a citizen of the United States, residing at Swampscott, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Door-Springs, of which the following is a specification.

This invention relates to door springs.

More particularly it relates to improvements in springs for closing doors and for holding them closed.

The purpose of the invention is to provide an improved device of simple construction, which can be manufactured at small expense and which can be readily applied to a door.

The objects of the invention are accomplished by the device herein described, an embodiment of which is illustrated in the accompanying drawings, in which,

Figure 1 is a perspective view; Fig. 2 is a plan, showing the door open, with the closed position shown in dotted lines; and Fig. 3 is a side elevation in section through the sheave support, the sheave being shown in full.

Referring to the drawings, a door 10 is represented set in position in a casing 11. On the door is a bracket 12 which may be provided with a suitable base and fastened firmly on the door by screws or other suitable means. This bracket is located at the top and near the hinged edge of the door, and is provided with an upward projecting arm 12′ which reaches up far enough so that it overlaps the casing above the door to a degree. The arm has a neck 13 near its end, adapted to receive and hold the end of a spiral spring 14. This spring, attached at one end to the bracket 12 as described, is attached at its other end to a pin or any other suitable fastening 15 set in the casing close above the door and at a considerable distance from the hinge of the door. Between these two fastenings of the spring is a sheave 16 mounted on the door casing, the spring passing around the sheave on the side thereof which is toward the casing.

The bracket supporting the sheave is marked 17 and the stud on which the sheave is pivoted 18. In the form shown in Fig. 3 the stud is supported at both ends by the bracket, which being attached to the casing only on one side of the sheave, passes in a loop around the outer edge of the sheave and is bent inward to a point just beyond the other end of the stud. This enables the sheave to be set very close to the under edge of the casing above the door, because no base for supporting the sheave is required on the side thereof toward the door. The sheave is placed in position on the casing rather close to the position of the bracket 12 on the door with the result that the spring 14 in going around the sheave bends around substantially a quadrant. In the device illustrated, the coil of the spring may be about $\frac{3}{8}$ of an inch in diameter, and the groove and the sheave of corresponding size.

The pin 15 is set in such a position that the spring is under suitable tension when the door is closed as illustrated in Fig. 1. When the door is opened the bracket 12 swings about the axis of the hinges of the door as a center and thus, although its end travels in an arc, moves progressively farther away from the anchorage 15 of the spring on the casing, and from the sheave. In so doing the spring is elongated. In the drawings, for the sake of clearness, it is necessary to represent an elongation considerably greater than that which would occur as the parts are ordinarily arranged. It will be observed that the total length of the spring may be great enough so that the elongation is but a small portion of the total length of the spring, so that the increase of tension is not excessive. This increase of tension, moreover, is distributed over the entire length of the spring, the sheave turning as much as necessary on its axis, as the spring, which lies in frictional contact with it, is extended.

By the device of passing the spring around the sheave, materially greater uniformity of tension between closed and open positions is attained than if the spring were led direct from the arm 12′ to its anchorage 15. This is evident upon comparing the two positions of the movable end of the spring, as seen in Fig. 2, where the position when the door is closed is marked A; and a position when open B. If the spring went straight from 12′ to 15, the extension of the spring upon opening the door to the position illustrated would be substantially equal to the distance between positions A and B. The actual extension, however, is not so great, because the spring when in its extended position runs in a straight line from B to the underside of the sheave; and when not extended runs in a straight line,

or as close to a straight line as may be, from the position A to the underside of the sheave; and the difference between these two lengths is not equal to the distance between A and B. This is because the base of the sheave is not in a straight line with A and B, but is at one side thereof. The difference between the distances of it from A and from B is less than the distance between A and B. The degree of this difference will depend upon the form of the triangle which it constitutes with points A and B, and upon the relative dimensions of the sides of this triangle. It will also be noticed that the pull of the spring upon the bracket arm 12′ is approximately normal to the side of the door, whether the door be open as shown at B or closed as shown at position A. Consequently the spring may be under relatively light tension when the door is closed, and yet all or practically all of the full force of that tension is directly available for use in keeping the door shut. This would not be the case if, for example, the spring ran direct from position A to its anchorage 15, because the spring would be running so nearly parallel with the door. This is a matter of importance where it is desired to keep a door closed tight without having the spring under excessive tension. The initial tension of the spring may be varied by placing the anchorage 15 at a different distance from the hinge. The degree of extension which the spring undergoes when the door is opened may be made less by putting the bracket and sheave nearer to the hinge of the door than shown in the drawings. While a rotatable sheave is the best form for the purpose, it is obvious that a non-rotatable sheave might be used, or some other kind of guide through which the spring may be rove. Variations may also be made in the proportions and in the arrangement of the parts in other respects without departing from the scope of the invention.

What I claim is:—

1. The combination with a door and door casing, of a bracket fixed on the door at its top near its hinged edge; a sheave on the casing above the door and near said edge; and a spring attached between the bracket and a stationary point above the door at a distance from the sheave, the spring passing from said point to and around the sheave on the casing and thence to the bracket on the door.

2. The combination, with a door spring, of a rotatable sheave and a mount therefor, comprising a base; an arm projecting therefrom, passing around the remote edge of the sheave and back, stopping at the axis of the sheave; and a stud, constituting the axle of the sheave, held at both ends in said arm, whereby the sheave may be sustained on a door casing without having a base between it and the edge of the casing.

Signed by me at Boston, Mass., this twentieth day of December, 1910.

ALBERT G. POTTER.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."